

Metabolism of ICU patients with Covid-19 differs from those with Influenza A

CIC biomaGUNE is participating in research that has identified a "metabolic fingerprint" making it possible to differentiate between patients with respiratory failure caused by COVID-19 and those in whom the cause is Influenza A

These alterations help the mechanisms of Covid-19 to be understood and new therapeutic targets to be developed because they enable "even clinical manifestations to be anticipated"

Donostia-San Sebastian. 10 December, 2021. Many patients admitted to ICUs for Covid-19 develop respiratory failure (Acute Respiratory Distress Syndrome, ARDS) with a 30% mortality rate during the first wave of the pandemic. In this regard, the journal *Critical Care* has published a study that identifies among ICU patients a differential metabolic "fingerprint" between those infected by SARS-CoV-2 and those infected by influenza A (H1N1-2009). This work has been conducted by researchers from the CIBER of Respiratory Diseases (CIBERES) at the Complutense University of Madrid (UCM) and the University Hospital of Getafe, with the collaboration of CIC biomaGUNE.

The team led by José Izquierdo, lecturer at the Faculty of Pharmacy and researcher at the UCM's Pluridisciplinary Institute, and former researcher in the research group at CIC biomaGUNE led by [Jesús Ruiz Cabello](#), has studied the levels of metabolites –molecules involved in chemical reactions in living beings– in blood samples from ICU patients within the framework of the CIBERES Acute Lung Injury Research Program.

According to Dr Izquierdo, coordinator of the work in which, apart from CIC biomaGUNE, the Hospital Español of Montevideo has also participated, "in medicine these metabolites are routinely measured, such as blood glucose or uric acid, but what is different about our method is that we are able to take a snapshot of all the metabolites in a biological sample and identify how an infection modifies them simultaneously. This distinctive pattern is a sort of fingerprint that allows us to anticipate even clinical manifestations".

José Ángel Lorente, CIBERES researcher and head of the Intensive Care Unit at Getafe Hospital, believes that "the description of the metabolic alterations induced by SARS-CoV-2 infection in critically ill patients is essential for studying the pathobiological mechanisms involved in the syndrome, and these differences could have implications for the discovery of new biomarkers and therapeutic targets for the disease".

Analyzing metabolic "fingerprinting" as a tool in respiratory infections

To conduct the study, blood serum samples from patients with ARDS resulting from Covid-19 were collected during the first wave of the pandemic (from March 1 to June 30, 2020) at the University Hospital of Getafe, and were compared with samples from patients with pneumonia and ARDS resulting from Influenza A collected by the same team at the Madrid hospital and at the Hospital del Mar in Barcelona during the 2009 epidemic. The blood sample is analyzed by means of Magnetic Resonance Spectroscopy and the results are obtained in approximately 15 minutes.

The next step in this study, once its efficacy has been replicated in a larger population, will be to use the metabolic "fingerprinting" analysis as a tool for the diagnosis and prognosis of patients with respiratory infections.

About CIBERES

The Network Centre for Biomedical Research (CIBER) is a consortium that reports to the Carlos III Institute for Health (Ministry of Science and Innovation) and is co-funded through ERDF funding. The CIBER of Respiratory Diseases (CIBERES) aims to promote and facilitate research into respiratory diseases through research excellence and its rapid and safe transfer to clinical practice. Set up in 2007, CIBERES currently brings together nearly 400 researchers across nine autonomous communities (regions) who work together in 3 Scientific Programs, which include the following lines of research: lung cancer, sleep apnea, pulmonary fibrosis, pulmonary hypertension, asthma, acute lung injury, tuberculosis, pneumonia, Chronic Obstructive Pulmonary Disease (COPD) and new therapeutic targets.

About CIC biomaGUNE

The Center for Cooperative Research in Biomaterials CIC biomaGUNE, member of the Basque Research and Technology Alliance ([BRTA](#)), conducts state-of-the-art research at the interface between Chemistry, Biology and Physics, devoting particular attention to studying the properties of biological nanostructures on a molecular scale and their biomedical applications. It was recognized in 2018 as a "María de Maeztu" Unit of Excellence for meeting requirements of excellence, which are characterized by a high impact and level of competitiveness in its field of activity on the global scientific stage.

Bibliographical reference

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Metabolomic differences between COVID-19 and H1N1 influenza induced ARDS.

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